JP KHK

PU 010153 (JP2000354023)

(11) Publication number: 2000-354023

(43) Date of publication of application: 19.12.2000

(51) Int.Cl. H04L 1/00

H03M 13/03 H04B 7/204

(21) Application number: 11-166498

(22) Date of filing: 14.06.1999

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(54) Name of the invention: Transmission system

(57) Abstract:

PROBLEM TO BE SOLVED: To eliminate disturbances or discontinuation of video signals and audio signals by noise.

SOLUTION:

A transmission system is provided with a data delaying device 24 which only adds a temporal delay to one side of data separated into two series by means of a distributor P at a transmitting station 1 and a delaying device 29, which adds the same temporal delay as that added by the device 24 to the other side of the data, to which no temporal delay is added on the transmission side and a switch 31 which selectively inputs data without faults between the two series of data at a receiving station 2.

[Claims]

[Claim 1]

Divide into two series the data encoded by the transmitting side, and delay is added only to another side. After multiplexing the data of these two series and error correcting coding, it transmits to a receiving side via a satellite circuit. After restoring to this transmitted data by the receiving side and carrying out an error correction decryption, separate into the data of two series before multiplexing by the transmitting side, and delay is added to the data of a sequence with which delay is not added by the transmitting side among the data of two series. The transmission system characterized by decrypting after choosing the data of the sequence which adds delay to both two series, performs data error detection of the data of these two series, and does not have an error.

[Claim 2]

The transmission system according to claim 1 characterized by decrypting the data of two series with which delay was added to another side, respectively, performing data error detection of the data of two series by one side, choosing the data of a sequence without an error, and acquiring a decode signal by the above mentioned receiving side.

[Claim 3]

By the above mentioned transmitting side, error correcting code the encoded data, and the error correcting coded data are divided into two sequences.

After adding delay only to that another side and multiplexing the data of these two series, after transmitting to a receiving side via a satellite circuit and restoring to this transmitted data by the receiving side, separate into the data of two series before multiplexing by the transmitting side, and delay is added to the data of a sequence with which delay is not added by the transmitting side among the data of two series. The transmission system according to claim 1 which adds delay to both two series, carries out the error correction decryption of the data of these two series, respectively, and is characterized by decrypting after choosing the data of the sequence that performs data error detection of the data of two series by one side, and does not have an error.

[Claim 4]

The transmission system according to claim 3 characterized by decrypting the data of the two series by which the error correction decryption was carried out, respectively, performing data error detection of the data of two series by one side, choosing the data of a sequence without an error, and acquiring a decode signal by the above mentioned receiving side.

[Claim 5]

The transmission system according to claim 1 or 2 characterized by transmitting to a receiving side via a satellite circuit after dividing a signal into two sequences by the above mentioned transmitting side, encoding the signal of the separated two series, respectively, adding delay only to that another side

among the data of the encoded two series, multiplexing the data of these two series and error correcting coding.

[Claim 6]

Divide a signal into two series by the transmitting side, add delay only to that another side, and the signal of these two series is encoded, respectively. After multiplexing the data of the encoded two series and error correcting coding, after transmitting to a receiving side via a satellite circuit, restoring to this transmitted data by the receiving side and carrying out an error correction decryption, after separating into the data of two series before multiplexing by the transmitting side and decrypting, respectively, delay is added to the signal of a sequence with which delay is not added by the transmitting side among the signals of two series. The transmission system characterized by choosing the signal of the sequence that adds delay to both two series, performs data error detection of the data of two series by one side, and does not have an error.

[Claim 7]

In the transmission system which receives a video signal or a sound signal by the above mentioned receiving side via a satellite circuit from the above mentioned transmitting side The distributor that divides a signal or data into two series, and the delay device that adds time delay only to the other side divided into two series are formed in the above mentioned transmitting side. The delay device that adds the same time delay as the delay device of a transmitting side to the side to which delay is not added by the transmitting side among

the above mentioned two series, The transmission system according to claim 1 to 6 characterized by preparing the switcher that inputs alternatively the side which does not have an error from the data error information on the above mentioned two series in the above mentioned receiving side.

[Detailed description of the invention]

[0001]

[Field of the invention] This invention relates to the transmission system that transmits a video signal and a sound signal digitally by the communication line that uses the communication satellite.

[0002]

[Description of the prior art] Figure 8 is the block diagram showing the configuration of the general transmission system in the case of transmitting an image and a sound signal by the communication line that used the communication satellite. In this drawing, for the sending station 1 that encodes a video signal and a sound signal and is transmitted, and 3s, electric-wave 3a transmitted from the sending station 1 is received, it is the communication satellite that transmits electric-wave 3b to a receiving station 2 side, and the satellite circuit 3 as a communication line consists of these 3s of communication satellites and electric waves 3a and 3b. 2 is a receiving station that receives electric-wave 3b of this satellite circuit 3, and decrypts the image and a sound signal from a sending station 1.

[0003]

The internal configuration of a sending station 1 is explained below. The input terminal 4 into which a video signal is inputted, the image encoder 5 that encodes the video signal from an input terminal 4 to the image coded data of a digital signal, the input terminal 6 into which a sound signal is inputted, the voice encoder 7 which encodes the sound signal from an input terminal 6 to a digital signal, the multiplexing device 8 that multiplexes the encoded coded data of the image encoder 5 and the voice encoder 7, the error correcting code device 9 that adds an error correction signal to the coded data multiplexed with the multiplexing vessel 8, and is encoded, the modulator that modulates the coded data 10 was encoded with the error correcting code vessel 9, the up converter 11 that changes the modulating signal modulated with the modulator 10 into the frequency that can be transmitted by the satellite circuit 3 (U/C), the high power amplifier (HPA) 12 that amplifies the RF signal by which frequency conversion was carried out by the up converter 11, and 13 are antennas for transmission which transmit electric-wave 3a towards 3s of communication satellites from the output of the high power amplifier 12.

[0004]

Next, the internal configuration of a receiving station 2 is explained below. So that the receiving dish 14 that receives electric-wave 3b from 3s of communication satellites, the low noise amplifier (LNA) that amplifies the RF signal 15 that was received with the receiving

antenna 14 and 16 may tend to restore to the RF signal amplified with the low noise amplifier 15. The down converter (D/C) changed into a low frequency, the demodulator that recovers the above mentioned coded data from the low frequency signal to which frequency conversion 17 was carried out with the down converter 16, the error correction decoder that corrects and decrypts this error from an error correction signal when 18 has an error in the coded data to which it restored with the demodulator 17, 19 is decrypted with the error correction decoder 18, and from the above mentioned multiplexed coded data. The demultiplexing device divided into image coded data and voice coded data before multiplexing, The image decoder 20that decrypts a video signal from the image coded data of the digital signal separated with the demultiplexing vessel 19, the output terminal to which the video signal 21 was decrypted with the image decoder 20 is outputted, the voice decoder 22 that decrypts a sound signal from the voice coded data of the digital signal separated with the above mentioned demultiplexing vessel 19, and 23 are output terminals to which the sound signal decrypted with the voice decoder 22 is outputted.

[0005]

Next, actuation is explained. First, the video signal inputted into the image input terminal 4 in the sending station 1 is encoded with the image encoder 5, and the sound signal inputted into the voice input terminal 6 is encoded with the voice encoder 7. Video signal coded data and sound signal coded data are multiplexed with

the multiplexing vessel 8, are error correcting coded with the error correcting code vessel 9, and are modulated with a modulator 10. After frequency conversion of the modulated modulating signal is carried out to the RF signal for satellite circuit 3 by the up converter 11 and power amplification is carried out with the high power amplifier 12, it is sent to the satellite circuit 3 through the antenna 13 for transmission.

[0006]

On the other hand, in a receiving station 2, the signal received with the receiving dish 14 is amplified with a low noise amplifier 15, and frequency conversion is carried out with a down converter 16, and it is sent to a demodulator 17. After getting over with a demodulator 17, an error correction decryption is performed by the error correction decoder 18, and it is separated into video signal coded data and sound signal coded data by the demultiplexing device 19. The video signal coded data and the sound signal coded data that were separated are decrypted with the image decoder 20 and the voice decoder 22, respectively, and are outputted from the video signal output terminal 21 and the sound signal output terminal 23.

[0007]

Usually, as the modulation technique used for a modulator 10 and a demodulator 17 when transmitting a video signal digitally through a satellite PSK method (Phase Shift Keying), QPSK of 4 phase modulation technique, 8PSK of 8 phase modulation technique, etc.

are used especially. As error correcting system used for the error correcting code device 9 and the error correction decoder 18, the method that uses the concatenated code of a Reed Solomon code and a convolutional code is common. Also, generally the satellite circuit 3 using the transponder (transmitter-receiver) that can transmit and receive the electric waves 3a and 3b of 27MHz or a 36MHz band is used for 3s of communication satellites. When transmitting an image and voice digitally in these bands, in order to utilize the inside of this band effectively, a video signal and a sound signal reduce amount of information, and it is indispensable to narrow the transmission band to occupy, and to transmit and receive it. Butt, if the amount of information of an image and a sound signal is reduced in order to narrow a transmission band, since the received image, audio image quality, and tone quality will deteriorate, the amount of information of a video signal and a sound signal is determined by trade-off of image quality and a transmission band. For example, by the junction of a broadcasting station, the transmission band that can be transmitted four waves is mainly used by the transponder of a 36MHz band, and the rate of an information compression of the video signal that can be set in this case amounts to 1 / 10 - 1/15.

[0008]

[Problems to be solved by the invention] Although the video signal and the sound signal are conventionally transmitted with the above configurations, when a data error occurs on the satellite circuit 3, the image quality and tone quality by the side of a receiving station 2 deteriorate, the case where the rate of an information compression of an image and a sound signal is high, and an information compression are not performed, and the case where compressibility is low are compared, and the rate of an information compression of a video signal is high, the image quality of a data error and the effect on tone quality degradation are large.

When prediction between the frame fields is performed as a coding method of an image, the error correction was carried out and a data error occurs to prediction information, the mistaken prediction information will be succeeded for a long time, an error will remain in data, and degradation of image quality becomes large. Also, when a data error occurs in the control information of high efficiency coding, it may become out of control with the image decoder 20, and decryption actuation of an image may stop.

For this reason, in digital transmission of the video signal that used the satellite circuit 3, the transmission approach by which the error rate property on the satellite circuit 3 the error correcting code device 9 and the error correction decoder 18 perform error correcting coding of a duplex is improved usually adopted.

However, when the data error that cannot be corrected with the error correction decoder 18 occurred by degradation of the sudden circuit quality by the noise of devices for satellite transmission, such as a noise on the satellite circuit 3, and the modulator 10 in a sending station 1, an up converter 11, etc., there was a problem that an image will be greatly confused by the receiving station 2 side, or a video signal and a sound signal will break off.

[0009]

It was not made in order that this invention might cancel the above mentioned trouble, and even if it is the case where the data error that cannot be corrected with an error correction decoder occurs, it aims at canceling disturbances and the way piece of a video signal and a sound signal.

[0010]

[Means for solving the problem] The transmission system of this invention according to claim 1 divides into two series the data encoded by the transmitting side. After adding delay only to that another side, multiplexing the data of these two series and error correcting coding, after transmitting to a receiving side via a satellite circuit, restoring to this transmitted data by the receiving side and carrying out an error correction decryption, separate into the data of two series before multiplexing by the transmitting side, and delay is added to the data of a sequence with which delay is not added by the transmitting side among the data of two series. It is the method decrypted after

choosing the data of the sequence that adds delay to both two series, performs data error detection of the data of these two series, and does not have an error.

[0011]

The transmission system of this invention according to claim 2 is the above mentioned receiving side, and is a method that chose the decryption data of the sequence that decrypts the data of two series with which delay was added to another side, respectively, performs data error detection of the data of two series by one side, and does not have an error.

[0012]

Error correcting coding the data that the transmission system of this invention according to claim 3 is the above mentioned transmitting side, and were encoded, and the error correcting coded data are divided into two sequences. After adding delay only to that another side and multiplexing the data of these two series, after transmitting to a receiving side via a satellite circuit and restoring to this transmitted data by the receiving side, separate into the data of two series before multiplexing by the transmitting side, and delay is added to the data of a sequence with which delay is not added by the transmitting side among the data of two series. It is the method decrypted after choosing the data of the sequence that adds delay to both two series, carries out the error correction decryption of the data of these two series, respectively, performs data error detection of the data of two series by one side, and does not have an error.

[0013]

The transmission system of this invention according to claim 4 is the above mentioned receiving side, and is a method that chose the decryption data of the sequence that decrypts the data of the two series by which the error correction decryption was carried out, respectively, performs data error detection of the data of two series by one side, and does not have an error.

[0014]

After the transmission system of this invention according to claim 5 divides a signal into two sequences by the above mentioned transmitting side, encodes the signal of the separated two series, respectively, adds delay only to that another side among the data of the encoded two series, multiplexes the data of these two series and error correcting coding it, it is a method transmitted to the receiving side via the satellite circuit.

[0015]

The transmission system of this invention according to claim 6 divides a signal into two series by the transmitting side. Add delay only to that another side and the signal of these two series is encoded, respectively. After multiplexing the data of the encoded two series and error correcting coding, After transmitting to a receiving side via a satellite circuit, restoring to this transmitted data by the receiving side and carrying out an error correction decryption, After separating into the data of two series before multiplexing by the transmitting side and decrypting,

respectively, delay is added to the signal of a sequence with which delay is not added by the transmitting side among the signals of two series. It is the method that chose the signal of the sequence that adds delay to both two series, performs data error detection of the data of two series by one side, and does not have an error.

[0016]

In the transmission system with which the transmission system of this invention according to claim 7 receives a video signal or a sound signal by the above mentioned receiving side via a satellite circuit from the above mentioned transmitting side The distributor that divides a signal or data into two series, and the delay device which adds time delay only to the other side divided into two series are formed in the above mentioned transmitting side.

It is the method that prepared the delay device that adds the same time delay as the delay device of a transmitting side to the side to which delay is not added by the transmitting side among the above mentioned two series, and the switcher that inputs alternatively the side that does not have an error from the data error information on the above mentioned two series in the above mentioned receiving side.

[0017]

[Embodiment of the invention] The embodiment of this invention is explained based on a drawing.

[0018]

Embodiment 1.Figure 1 is the block diagram showing the configuration of the transmission system concerning the embodiment 1 of this invention, and the same things as figure 8 uses the same signs. In this drawing, for the sending station 1 that encodes a video signal and a sound signal and is transmitted, and 3s, electric-wave 3a transmitted from the sending station 1 is received, it is the communication satellite which transmits electric-wave 3b to a receiving station side 2, and the satellite circuit 3 as a communication line consists of these 3s of communication satellites and electric waves 3a and 3b. 2 is a receiving station that receives electric-wave 3b of this satellite circuit 3, and decrypts the image and a sound signal from a sending station 1.

The internal configuration of a sending station 1 is explained below as compared with the conventional example. With the embodiment 1, if it observes between the image encoder 5 and the multiplexing device 8, the output side of the image encoder 5 is separated into two sequences by Distributor P, one output is inputted into the multiplexing device 8, the data delay device 24 is formed in the output side of another side that remains, and the output of this data delay device 24 is inputted into the multiplexing device 8. Image coded data B which the data delay device 24 is a delay device which adds delay of predetermined time to the other side among two images coded data A outputted from the above mentioned image encoder 5, and was delayed by

predetermined time on the basis of image coded data A is outputted. Image coded data B to which delay was added, and image code data A to which delay is not added are inputted into the multiplexing device 8.

[0019]

Next, the internal configuration of a receiving station 2 is explained below as compared with the conventional example. If it observes between the demultiplexing device 19 and the image decoder 20, the data delay device 29 is formed in one output side between two video outputs outputted from the demultiplexing device 19, a switcher 31 is formed in the output side of this data delay device 29, and the output of another side of the demultiplexing device 19 is further connected to the input side of a switcher 31.

The change controller 32 is connected to this switcher 31, the data error information output side of the error correction decoder 18 and the data error information output side of the demultiplexing device 19 are connected to this change controller 32, and the above mentioned switcher 31 is controlled by this change controller 32. Image coded data E that is the delay device that adds the data delay device 24 by the side of a sending station 1 and delay for the same time amount to one image coded data C among the image coded data C and D from which the above mentioned data delay device 29 was separated with the demultiplexing vessel 19 and by which this delay was added to image coded data C is outputted. The above mentioned data delay

devices 24 and 29 are beforehand set up so that a time delay may become the same.

The above mentioned switcher 31 outputs image coded data F that changes to the data side of another side without a data error alternatively, and does not have a data error in the image decoder 20, when a data error is in one side among the image coded data D and E inputted. Control of this selection is performed by the change controller 32, and from the data error information outputted from the error correction decoder 18 and the demultiplexing device 19, this change controller 32 outputs the control signal that changes an input to a data side without a data error to a switcher 31, when a data error is detected by one side among the image coded data C and D.

Here, although the image coded data C and D are data transmitted through the satellite circuit 3, if the correspondence relation of image coded data A-D in a sending station 1 and a receiving station 2 is explained, image coded data C corresponds to image coded data A to which delay is not added by the transmitting side, and image coded data D corresponds to image coded data B to which delay was added with the image coded data delay vessel 24 by the transmitting side.

[0020]

Next, actuation is explained. In a sending station 1, the video signal inputted into the input terminal 4 is first encoded with the image encoder 5, and the sound signal inputted into the input terminal 6 is encoded with the voice encoder 7. And image coded data A that is the

output of the above mentioned image encoder 5 is divided into two series.

Among two, image coded data A of one sequence is inputted into the multiplexing device 8 as it is. Delay is added with the image coded data delay vessel 24, and image coded data A of the sequence of another side is inputted into the multiplexing device 8 as image coded data B. Subsequently, the multiplexing device 8 multiplexes both the inputted image coded data A and B, the voice coded data outputted from the voice encoder 7. The data multiplexed with the multiplexing vessel 8 are error correcting coded with the error correcting code vessel 9, and are modulated with a modulator 10. After frequency conversion of the modulated signal is carried out to the RF for satellite circuit 3 by the up converter 11 and power amplification is carried out with the high power amplifier 12, it is transmitted to the satellite circuit 3 through the antenna 13 for transmission.

[0021]

On the other hand than the satellite circuit 3, the signal received with the receiving dish 14 is amplified with a low noise amplifier 15, and frequency conversion is carried out with a down converter 16 in a receiving station 2. After restoring to the signal by which frequency conversion was carried out to low frequency with a demodulator 17, an error correction decryption is performed by the error correction decoder 18.

Although almost all data errors are corrected with this error correction decoder 18, when the errors which

cannot be corrected occur, data error information is outputted to the change controller 32. And the signal decrypted with the error correction decoder 18 is separated into the image coded data C and D, voice coded data, etc. of two series before multiplexing by the demultiplexing device 19. Also in this demultiplexing device 19, when the image coded data C and D have data lack etc., error information is outputted to the change controller 32.

And among the image coded data C and D separated with the demultiplexing vessel 19, one image coded data C passes along the data delay device 29 of the same amount of time delay as the data delay device 24 of a sending station 1, delay is added from this data delay device 29, it is outputted as image coded data E, and this image coded data E is inputted into a switcher 31. Also, image coded data D of another side is inputted into a switcher 31 as it is. That is, the image coded data D and E of these two series turn into the completely same data, when it means that delay was added to both sides and a data error does not occur during transmission. When this data error does not exist, one of the image coded data D and E is chosen, and it is inputted into a switcher 31.

The inputted data pass a switcher 31 and are outputted as image coded data F, it is decrypted with the image decoder 20 and a video signal is outputted from an output terminal 21.

[0022]

Here, when a data error occurs during transmission that is, the case where the data error by the noise on the satellite circuit 3 between the error correcting code device 9 and the error correction decoder 18 and the noise of the device for satellite transmission in a sending station 1 occurs is explained below. That is, if the data error has occurred, the data error of image coded data C or image coded data D will be judged from the data error information outputted from the error correction decoder 18 and the demultiplexing device 19, and a switcher 31 will be controlled by the change controller 32 to choose and input an image coded data side without an error. And a switcher 31 changes an input to the image coded data that does not have a data error among the image coded data C and D, and image coded data F without a data error is outputted. This image coded data F is decrypted with the image decoder 20, and a video signal is outputted from an output terminal 21.

[0023]

Here, the case where a data error occurs by degradation of the sudden circuit quality on the satellite circuit 3 is explained using figure 2. Figure 2 shows the relation of multiplexed image coded data G that is transmitted to the image coded data A and B of a sending station 1, and the satellite circuit 3, and image coded data C-F of a receiving station 2 typically to time series, and shows the 1-10th frame among the frames divided into unit

time amount. Also, the voice coded data is omitting. In this drawing, data #5 in the 5th frame of the data 5 in the 1st frame and image coded data B of image coded data A are the same contents, and the semantics of the figure in a frame shows that the same data are transmitted.

Here, in image coded data G multiplexed in this case, the time of data lack occurring in the 5th frame and the first half of the 6th frame is explained to an example supposing the case where a data error happens in the middle of transmission of the satellite circuit 3. First, the part of the time delay of the image coded data delay device 24 is shifted in time, and, as for the image coded data A and B by the side of a sending station 1, a part for 4 frame time is shifted in this case.

The image coded data A and B are multiplexed in this condition of having shifted, and two data are inserted in this case into one frame of multiplexed image coded data G. For example, although there are data 9 when it observes in the second half of the 5th frame, data #9 of the same contents are inserted in the 10th frame first half after 4 frame time from here. So, what is necessary is just to instead substitute data #9 in the first half of the 10th frame, though the data 9 in the second half of the 5th frame are breaking.

Therefore, even if the circuit quality on the satellite circuit 3 deteriorates and a data error occurs, if the time delay (four frames) of the image coded data delay device 24 is larger than this time amount that has

deteriorated, a data error will not generate one of the image coded data D or image coded data E.

[0024]

For example, when image coded data D is chosen, the video signal is being decrypted and the data error of image coded data D is detected by the 5th frame, a switcher 31 chooses an input from image coded data D as image coded data E without an error, and outputs it as image coded data F. And when a data error is detected by image coded data E by the 10th frame, switcher 31 changes an input to image coded data D, and outputs it as image coded data F. If this image coded data F is decrypted with the image decoder 20, the data error of image coded data F will not be generated.

[0025]

Also, although the case where this invention was applied to image coded data was explained, this invention may be applied to voice coded data, and you may apply not only to an image or voice but to different data, such as a text file.

[0026]

If it does in this way, even if a data error occurs by degradation of the circuit quality of the sudden satellite circuit 3, a data error cannot occur in image coded data F outputted to the side that does not have an error by changing, but a decryption of a video signal and a sound signal can be continued, and disturbances and the way piece of a video signal and a sound signal can be prevented.

[0027]

Embodiment 2.Although the above mentioned embodiment 1 explained the case where chose the sequence that changes the image coded data D and E of two sequences, and does not have a data error, and it decrypted with one image decoder 20, as shown in figure 3, the embodiment 2 changes and outputs two decrypted video signals by the switcher 34 by the receiving station 2 side, after decrypting the image coded data D and E of two sequences with two respectively separate image decoders 20a and 33. In this drawing, image decoder 20a which decrypts image coded data E to a video signal is prepared in the output side of the data delay device 29. The image decoder 33 that decrypts image coded data D to a video signal is formed in the output side of another side of the demultiplexing device 19.

The switcher 34 that changes alternatively the video signal decrypted, respectively and inputs it is formed in the output side of these images decoders 20a and 33, and control of this switcher 34 is performed by the change controller 32. The error information on the image decoders 20a and 33 is inputted into this change controller 32. Although it was the configuration that uses the data error information on the error correction decoder 18 and the demultiplexing device 19 for a data error judging with the change controller 32 with the above mentioned embodiment 1. If it does in this way, the data error information on the image decoders 20a and 33 can also be used for a data error judging. Also

when the leakage in data error detection of the error correction decoder 18 and demultiplexing 19 occurs, the image decoders 20a and 33 can detect a data error certainly, and disturbances and the way piece of a video signal can be prevented more certainly.

[0028]

Embodiment 3.Although the above mentioned embodiment 1 explained the case where the multiplexed video signal coded data A and B with one multiplexing vessel 8, and one demultiplexing device 19 had separated into the image coded data C and D in the receiving station 2 side, in the sending-station 1 side as shown in figure 4, the embodiment 3 of this operation forms two multiplexing devices 8 and 36 in a sending-station 1 side, and forms two demultiplexing devices 19 and 37 in a receiving station 2 side. As shown in figure 4, the output side of the error correcting code device 9 is separated by two series with Distributor P, and the multiplexing device 36 is formed in the sending-station 1 side at one output side.

The data delay device 35 is formed in the output side of another side, the output of this data delay device 35 is connected to the above mentioned multiplexing device 36, and the output of this multiplexing device 36 is inputted into a modulator 10. On the other hand, the demultiplexing device 37 is formed in the output side of a demodulator 17 at a receiving station 2 side, and the output of the demultiplexing device 37 is distributed to two series. The data delay device 38 set as the same time delay as the above mentioned data delay device 35

is formed in one side at an output side, and the output of this data delay device 38 is inputted into error correction decoder 18a. The error correction decoder 39 is formed in the output side of another side of the demultiplexing device 37. The switcher 40 is formed in the output side of these error correction decoders 18a and 39. A switcher 40 is controlled by the change controller 32 and the error information on the above mentioned error correction decoders 18a and 39 is inputted into the change controller 32.

[0029]

That is, delay is added only to the other side that divided into two series the data by which error coding was carried out with the error correcting code vessel 9, and was divided into two series with the data delay vessel 35, and the data of these two series are multiplexed with the multiplexing vessel 36. This multiplexed data is transmitted to a receiving station 2 via the satellite circuit 3 through a modulator 10, an up converter 11, the high power amplifier 12, and the antenna 13 for transmission. In a receiving station 2 side, it gets over with a demodulator 17 through a receiving dish 14, a low noise amplifier 15, and a down converter 16. It separates into the data of two series before multiplexing this data to which it restored with the demultiplexing vessel 37.

Delay is added to the data by the side of the sequence to which delay is not applied by the transmitting side among the data of these two series with the data delay vessel 38, and delay is added to both data of two series.

And as for the data of these two series, error correction decode is performed by the error correction decoders 18 and 39, respectively. The data error information on the error correction decoders 18 and 39 performs a data error judging with the change controller 32, and the data of the sequence that does not have a data error by control of this change controller 32 are chosen by the change controller 32, and are inputted into a switcher 40. The multiplex coded data outputted from the switcher 40 is inputted and divided into the demultiplexing device 19. A video signal and a sound signal are decrypted with the image decoder 20 and the voice decoder 22 from the output of this demultiplexing device 19, and an image and a sound signal are outputted from output terminals 21 and 23. Thus, effectiveness equivalent to the embodiment 1 of invention is acquired.

[0030]

The signal of two sequences by which the error correction decryption was carried out is changed, it dissociates, and although the embodiment 3 of the embodiment 4. above mentioned implementation of operation explained the case where the separated signal was being decrypted with one decoder 20, as the embodiment 4 of this operation is shown in figure 5, it forms two image decoders 20b and 33b by the receiving station 2 side so that the image coded data of the two series by which the error correction decryption was carried out may be decrypted separately, respectively. In this drawing, demultiplexing device 19b is prepared in

the output side of one error correction decoder 18a, and image decoder 20b and voice decoder 22b are prepared in the output side of this demultiplexing device 19b. Also, image decoder 33b is prepared in the output side of the error correction decoder 39 of another side, and switcher 34b is prepared in the output side of these images decoders 20b and 33b.

This switcher 34b is controlled by the change controller 32, and the error information on the image decoders 20b and 33b is inputted into this change controller 32. That is, the multiplex coded data by which the error correction decryption was carried out by error correction decoder 18a is divided into image coded data, voice coded data, etc. by demultiplexing device 19b. This image coded data is decrypted by the video signal by image decoder 20b. On the other hand, the image coded data by which the error correction decryption was carried out with the error correction decoder 39 is decrypted by the video signal by image decoder 33b.

The video signal of these decrypted two series is alternatively inputted into switcher 34b controlled by the change controller 32. This change controller 32 performs a data error judging using the data error information on the error correction decoders 18a and 39 and the image decoders 20b and 33b, and controls the video signal switcher 34 to output the video signal of a sequence without a data error. Thereby, effectiveness equivalent to the embodiment 2 of invention is acquired.

[0031]

Embodiment 5.Although the above mentioned embodiment 1 explained the case where delay was added to the other side among the image coded data from which it encoded with one image encoder 5, and the video signal was separated into two series As shown in figure 6 , the embodiment 5 of this operation divides a video signal into two series by the sending station 1 side with the distributor 4 formed in the latter part of an input terminal 4, and forms two image encoders 5a and 41 that encode the video signal of these two series, respectively. That is, a video signal is distributed to two series in a sending station 1, it encodes by image encoder 5a, and one side is multiplexed with the multiplexing vessel 8.

After encoding with the image encoder 41 and another side adds delay with vessels of data delay devices 24, it is multiplexed with the multiplexing vessel 8, and it is transmitted to a receiving station 2. Thus, the same effectiveness as the embodiment 1 of invention or embodiment 2 is acquired according to the embodiment of a receiving station 2.

[0032]

Embodiment 6.Although the above mentioned embodiment 5 explained the case where delay was added with vessels of data delay devices 24 formed in the latter part of the image encoder 41, as shown in figure 7, with the embodiment 6 of this operation, in the

sending station 1, the delay device 42 is formed in the preceding paragraph of image encoder 41a, the delay device 43 is formed in the latter part of the image decoder 20, and the switcher 34 is formed in the preceding paragraph of an output terminal 21 in the receiving station 2.

The above mentioned delay devices 42 and 43 are set up so that a time delay may become the same beforehand. Namely, in a sending station 1, Distributor P separates a video signal into the video signal of two series, one video signal is encoded by image encoder 5a, and, as for the video signal of another side, delay is added with the delay vessel 42. It encodes by image encoder 41a, and the video signal of these two series is multiplexed with the multiplexing vessel 8, and the video signal with which delay was added is transmitted to a receiving station 2.

In a receiving station 2, the data to which it restored are returned to the image coded data of two series with the demultiplexing vessel 19, and it is decrypted with the image decoders 20 and 33, respectively. It means that delay is added with the delay vessel 43 and, as for the video signal of the sequence to which delay is not applied by the transmitting side, delay was added to both video signal of two series among the video signals of the decrypted two series.

The video signal of two series is alternatively inputted into the video signal switcher 34, respectively. The change controller 32 performs a data error judging using the data error information on the error correction

decoder 18, the demultiplexing device 19, and the image decoders 20 and 33, and controls a switcher 34 for the business which outputs the data of a sequence without a data error. That is, time delay is added in the state of an analog signal. Thus, the same effectiveness as the embodiment 2 of invention is acquired.

[0033]

Moreover, a sending station 1 and a receiving station 2 may be fixed stations fixed on the ground, may be a mobile station carried in the vehicle, the ship, etc., and may be a mobile station carried not only in an earth station but in an airplane etc. In addition, so that it may become the same as the time delay of the data delay devices 24, 35 and 42 of a sending station 1, although the time delay of the data delay devices 29, 38 and 43 of a receiving station 2 of the above mentioned embodiment 1, embodiment 6, set up beforehand. The information on a time delay is multiplexed as data in a sending station 1, the information on this time delay is separated in a receiving station 2, and you may make it set up the time delay of the data delay devices 29, 38 and 43.

[0034]

[Effect of the invention] As explained above, according to invention according to claim 1, the data encoded by the transmitting side are divided into two series. After adding delay only to that another side, multiplexing the data of these two series and error correcting coding, after transmitting to a receiving side via a satellite circuit, restoring to this transmitted data by the

receiving side and carrying out an error correction decryption, separate into the data of two series before multiplexing by the transmitting side, and delay is added to the data of a sequence with which delay is not added by the transmitting side among the data of two series. Delay is added to both two series, data error detection of the data of these two series is performed, and since it decrypted after choosing the data of a sequence without an error, disturbances and the way piece of a video signal and a sound signal can be prevented.

[0035]

Also, since the decode data of the sequence which decrypts the data of two series with which delay was added to another side, respectively, performs data error detection of the data of two series by one side, and does not have an error at the above mentioned receiving side were chosen according to invention according to claim 2, a data error can be detected more certainly and disturbances and the way piece of a signal can be prevented more certainly.

[0036]

Moreover, according to invention according to claim 3, error correcting code the encoded data by the above mentioned transmitting side and the error correcting coded data are divided into two sequences. After adding delay only to that another side and multiplexing the data of these two series, after transmitting to a receiving side via a satellite circuit and restoring to this transmitted data by the receiving side, separate into the data of two

series before multiplexing by the transmitting side, and delay is added to the data of a sequence with which delay is not added by the transmitting side among the data of two series. Delay is added to both two series, the error correction decryption of the data of these two series is carried out, respectively, data error detection of the data of two series is performed by one side, and since it decrypted after choosing the data of a sequence without an error, disturbances and the way piece of a video signal and a sound signal can be prevented.

[0037]

Moreover, since the decode data of the sequence that decrypts the data of the two series by which the error correction decryption was carried out, respectively, performs data error detection of the data of two series by one side, and does not have an error at the above mentioned receiving side were chosen according to invention according to claim 4, disturbances and the way piece of a video signal and a sound signal can be prevented.

[0038]

Also, according to invention according to claim 5, a signal is divided into two sequences by the above mentioned transmitting side. Since it transmitted to the receiving side via the satellite circuit after encoding the signal of the separated two series, respectively, adding delay only to that another side among the data of the encoded two series, multiplexing the data of these two series and error correcting coding, disturbances and the

way piece of a video signal and a sound signal can be prevented.

[0039]

Moreover, according to invention according to claim 6, a signal is divided into two series by the transmitting side. Add delay only to that another side and the signal of these two series is encoded, respectively. After multiplexing the data of the encoded two series and error correcting coding, after transmitting to a receiving side via a satellite circuit, restoring to this transmitted data by the receiving side and carrying out an error correction decryption, after separating into the data of two series before multiplexing by the transmitting side and decrypting, respectively, delay is added to the signal of a sequence with which delay is not added by the transmitting side among the signals of two series. Delay is added to both two series, data error detection of the data of two series is performed by one side, and since the signal of a sequence without an error was chosen, disturbances and the way piece of a video signal and a sound signal can be prevented.

[0040]

Also, according to invention according to claim 7, it sets to the transmission system which receives a video signal or a sound signal by the above mentioned receiving side via a satellite circuit from the above mentioned transmitting side. The distributor that divides a signal or data into two series, and the delay device which adds time delay only to the other side divided into two series are formed in the above mentioned transmitting side.

Since the delay device that adds the same time delay as the delay device of a transmitting side to the side to which delay is not added by the transmitting side among the above mentioned two series, and the switcher which inputs alternatively the side which does not have an error from the data error information on the above mentioned two series were prepared in the above mentioned receiving side disturbances of a video signal and a sound signal it breaks off or the error of data can be prevented.

[Brief description of the figures]

[Figure 1] is the block diagram showing the configuration of the transmission system concerning the embodiment 1 of this invention.

[Figure 2] is the diagram showing the image coded data concerning the embodiment 1.

[Figure 3] is the block diagram showing the configuration of the transmission system concerning the embodiment 2.

[Figure 4] is the block diagram showing the configuration of the transmission system concerning the embodiment 3.

[Figure 5] is the block diagram showing the configuration of the transmission system concerning the embodiment 4.

[Figure 6] is the block diagram showing the configuration of the transmission system concerning the embodiment 5.

[Figure 7] is the block diagram showing the configuration of the transmission system concerning the embodiment 6.

[Figure 8] is the block diagram showing the configuration of the conventional transmission system.

[Description of Notations]

1 sending station, 2 receiving station, 3 satellite circuit, 29, 24 data delay device, 31 switchers, 32 change controller, P distributor, A-G image coded data.

Fig. 2

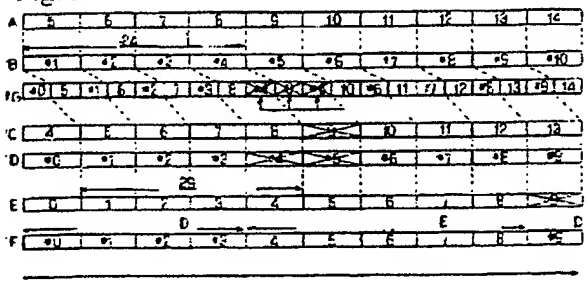

Fig. 1

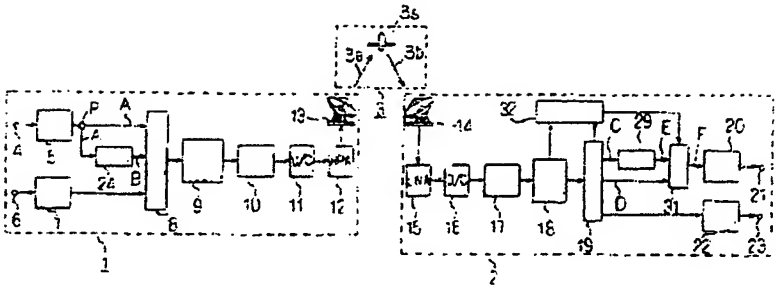

Fig. 3

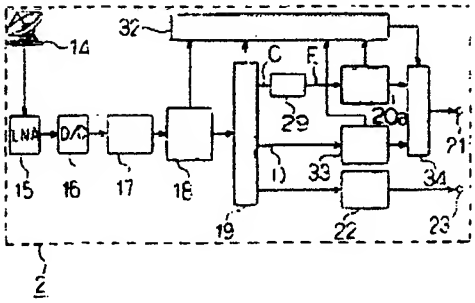

Fig. 6

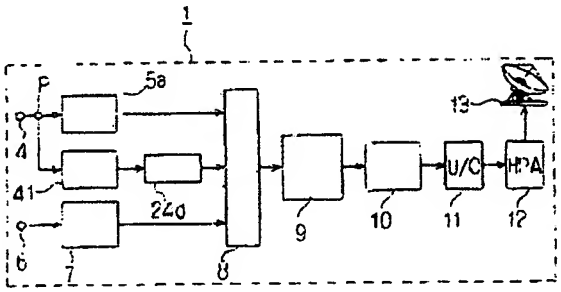

Fig. 4

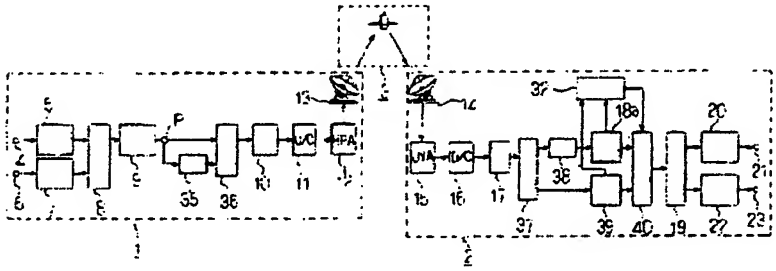

Fig. 5

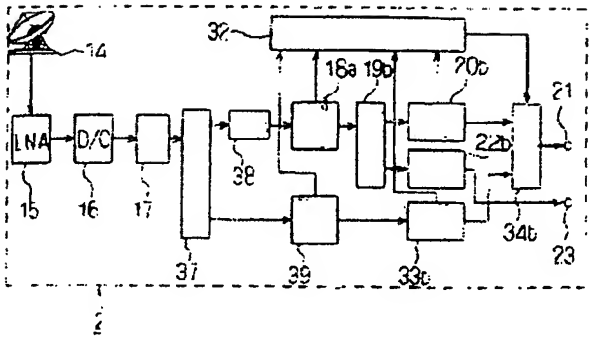

Fig. 7

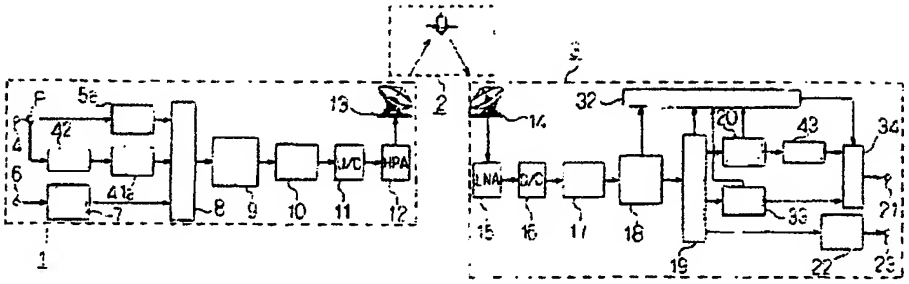

Fig. 8